

THE EFFECT OF INTRODUCING A DEDICATED SEVEN-DAY-A-WEEK VITREORETINAL ON-CALL SERVICE ON EMERGENCY SURGERY

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ABSTRACT

PURPOSE

The Royal College of Ophthalmologists (RCO) suggests that surgery for Retinal Detachment (RD) should be performed within a day for macula-on and within a week for macula-off detachments. We performed a retrospective study to determine whether a structured on-call rota for consultants out of hours resulted in an increase in these targets being achieved and therefore providing a seven-day-a-week service.

METHODOLOGY

A retrospective study of the 1726 emergency RD patients that presented or were referred to a specialist centre in the UK were reviewed for efficiency prior to and after the implementation of a Vitreoretinal (VR) on-call rota.

RESULTS

The mean length of time between presentation and surgery for macula-on RDs fell from 1.17 to 1.01 days ($p < 0.05$) after the establishment of the VR service. Those presenting on Sunday had a significantly less wait time for surgery from 2.56 to 1.00 days ($p < 0.05$). No patient had to be transferred out of the region for emergency surgery after the on-call service was introduced.

CONCLUSION

The commencement of an on-call service resulted in patients with macula-on RDs being treated more efficiently and meeting the treatment target of within 24 hours.

KEYWORDS

Vitreoretinal Surgery, Emergency, Retinal Detachment, Timing.

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INTRODUCTION: Retinal Detachment (RD) is a potentially blinding ophthalmological emergency that is treated by prompt surgical management to give good anatomical and visual outcomes.¹ They occur in approximately one in 10,000 people per year with approximately one in 300 affected over the course of their lifetime.² The average age of presentation is around 60 years with a higher incidence in males.^{3,4} Individuals experiencing the symptoms of retinal detachment should be referred directly to an eye casualty for Vitreoretinal (VR) assessment.⁵ Where the macula has not been involved in the RD, it is termed 'macula-on' and excellent visual outcomes can be achieved after successful reattachment surgery.

'Macula-off' RD, where the macula is involved have variably worse success rates. Therefore, early access to surgery for macula-on RD is essential.⁶ Although, macula-off RDs have a guarded visual prognosis, it has been shown that the best mean postoperative vision is greater in patients who have surgical intervention within one week than those who wait longer than six weeks.^{7,8} This is thought to be due to a combination of increased photoreceptor degeneration from prolonged relative ischaemia as the outer third of the holangiotic human retina is separated from its choroidal blood supply⁹ and an increase in the incidence of retinal scarring from Proliferative Vitreoretinopathy (PVR), which is more frequent the longer a retina is detached and the greater the area of the detachment.¹⁰

The Royal College of Ophthalmologists guidelines for RD management state that if it is macula-on, it should be operated on within 24 hours and if macula-off, on the next available operating list. They further recommend that a specialist VR surgeon should perform the operation as this is associated with better surgical results, they acknowledge that in most hospitals, there often will not be sufficient numbers of VR specialists to offer an unbroken on-call rota.

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As a result, there was concern that an acceptable standard of care for macula-on RD was not being provided at weekends.¹ Various studies showed that having appropriate consultant led cover improves outcomes for patients across specialities¹¹ and having such cover results in consistent care with no difference in mortality regardless of when the patient is admitted.^{12,13} The Birmingham and Midlands Eye Centre (BMEC) is a specialist receiving centre for ophthalmic emergencies in the West Midlands of England covering approximately 2 million patients. Before November 2011, there were no official VR on-call services. This resulted in a number of emergency cases being transferred out of the region to any other unit where a vitreoretinal surgeon happened to be available. From November 2011, a continuous regional VR on-call service was created. Here, the majority of the region's VR consultants collaborated to provide an on-call rota. BMEC provided a dedicated operating list to deal with weekend VR referrals and appropriate contracts were drawn up to give consultant access to the hospital. Clinical governance was promoted through regular regional VR specialist meetings. We performed a retrospective study to determine whether a structured out of hours VR on-call rota improved service efficiency and target achievement by providing a seven-day-a-week service.

METHODOLOGY: This was a retrospective study of all 1726 VR emergency referrals to BMEC over the 3-year period when the change in on-call services occurred. All referrals were recorded in an emergency referral logbook and operations in a theatre logbook. Inclusion criteria included all patients presenting to the eye centre who required a VR intervention. The data collected included the date of presentation, diagnosis, date of surgery, referral location, as well as demographic information including age and sex. Preliminary data were retrospectively collected on patients prior to the changes (Group 1) from April 2010 to October 2011, the new system was introduced over November 2011 and a further dataset were collected (Group 2) from December 2011 to May 2013. The data were analysed on the free-source World Health Organization epidemiological program Epi Info™ and the two groups compared. Statistical analysis was performed using the Student's 'T' test.

RESULTS: A total of 1726 emergency procedures were reviewed; 871 cases in group 1 and 855 cases in group 2. Overall, 629 (36.4%) were female and 1097 (63.6%) male and the ratio did not vary between the groups ($p > 0.20$). The age range was from 2 to 96 years with a mean of 58.5 years. The range and frequency of the diagnoses requiring emergency surgery is summarised in Table 1. The great majority of emergencies were from RD cases (82%) with a higher proportion macula-on (38%), than macula-off (44%). Other common presentations included displaced lens fragments after cataract surgery (6%) and retinal tears that required indirect laser retinopexy in theatre (7%). The study did not include cases of retinal tear that were treated in the emergency department.

Diagnosis	Frequency	Percent
Acute retinal necrosis	1	0.06%
Dropped nucleus	108	6.26%
Endophthalmitis	5	0.29%
Foreign Body	8	0.46%
Globe repair	1	0.06%
Infected scleral buckle	1	0.06%
Lenectomy	1	0.06%
Mac OFF RD	656	38.01%
Mac ON RD	758	43.92%
Penetrating injury	23	1.33%
Retinal cyst	1	0.06%
Retinal haemorrhage	5	0.29%
Retinal Tears	122	7.07%
Subluxed IOL	2	0.12%
Traumatic cataract	1	0.06%
Undefined RD	10	0.58%
Vitreous Haemorrhage	23	1.33%
Total	1726	100.00%

Table 1: Emergency Presentations Requiring Surgery at BMEC

BMEC serves a wide population and takes VR referrals from all over the region making up a total of 30.8% of its total work. There were twenty referrals directly from opticians and general practitioners. Of the total number, 23% of cases initially presented to the BMEC Emergency Department (ED) with a further 7.2% from collaborating hospitals to include Worcester Royal, Coventry and Warwick as well as Queen Elizabeth Hospital, Birmingham, with the other 23.6% referrals being from hospitals other than the collaborating trusts. A minority 0.5% attended from outside the West Midlands including Aberystwyth, Bolton, Lancashire, and military patients who were aeromedically transferred from abroad. The greatest number of patients presented on a Thursday for both groups. In group 1, these cases often did not receive their operation until the weekend due to the mismatch between number of presentations and operations (Figure 1). After extra theatre time was made available on Fridays, this reduced from 1.86 to 1.11 days (Table 2) thus reducing weekend workload.

Day of Presentation	Mean Length of Time between Presentation and Surgery (Days) Pre On-Call Service	Mean Length of Time between Presentation and Surgery (Days) Post On-Call Service
Sun	2.56	1.00
Mon	0.75	0.94
Tue	0.61	0.83
Wed	0.93	1.00
Thurs	1.86	1.11
Fri	1.05	1.14
Sat	1.07	1.47

Table 2: The Effect on the Introduction of an On-Call Consultant VR Service on the Mean Length of Time between Presentation and Surgery

Initially, there was a great deal of variation with a long waiting time at weekends, the introduction of a new system resulted in less variation and on average lower waiting times. The audit was particularly focused at looking at the effect of introducing an on-call VR service on the length of time RDs took to be operated on. This was where particular service provision changes were made in order to provide better standards of care by reducing the length of time between presentation and the treatment intervention required. Before the introduction of the on-call service, a total of 29 referrals were refused to be accepted and a further 7 patients were transferred to other units for treatment, most commonly Moorfields Eye Hospital, London. Since the commencement of the service, no patients had been transferred out of the region and no refusals had been made. This is clearly an improvement for patient care in the region and is as a direct result of having a VR on-call service.

Macula-On RDs: Prior to the on-call system, there were significant differences in the length of time between presentation and treatment intervention depending on which day of the week the patient attended the eye centre. In particular, this was more marked on Sundays. Having introduced a VR on-call system, there is now a much better consistency between each day with only Saturday having a statistically significant longer length of time ($p < 0.05$). Table 2 shows the previous variation in day of presentation and operation compared to now, which shows a more consistent level of care for emergency patients.

Overall, the mean length of time between presentation and treatment intervention had fallen from 1.17 to 1.01 days ($p < 0.05$) after the introduction of the VR on-call service, which is almost meeting the recommended target. The greatest change is seen for those patients that presented on a Sunday with macula-on RDs who on average were waiting 2.56 days in group 1 compared to the 1.00 days in group 2 ($p < 0.05$).

Macula-Off RDs: In group 1, 83% of RDs that were macula-off were achieving the RCO recommendation of having surgery within 7 days of presentation with a mean length of time between presentation and surgery being 4.68 days. However, in group 2, initially only 75.97% were being operated on within this time between December 2011 and November 2012. However, after this time between December 2012 and May 2013, 86.84% of patients were being operated on within 7 days with a mean length of time between presentation and surgery being 3.72 days. Figure 2 shows that for macula-off RDs, there is still variation in the mean length of time between presentation and surgery. This is dependent on which day of the week the patient presents with the least significant difference on Friday overall. However, although, there was an initial increase in wait time post service implementation, after one year this had been addressed and in general patients are being operated on quicker.

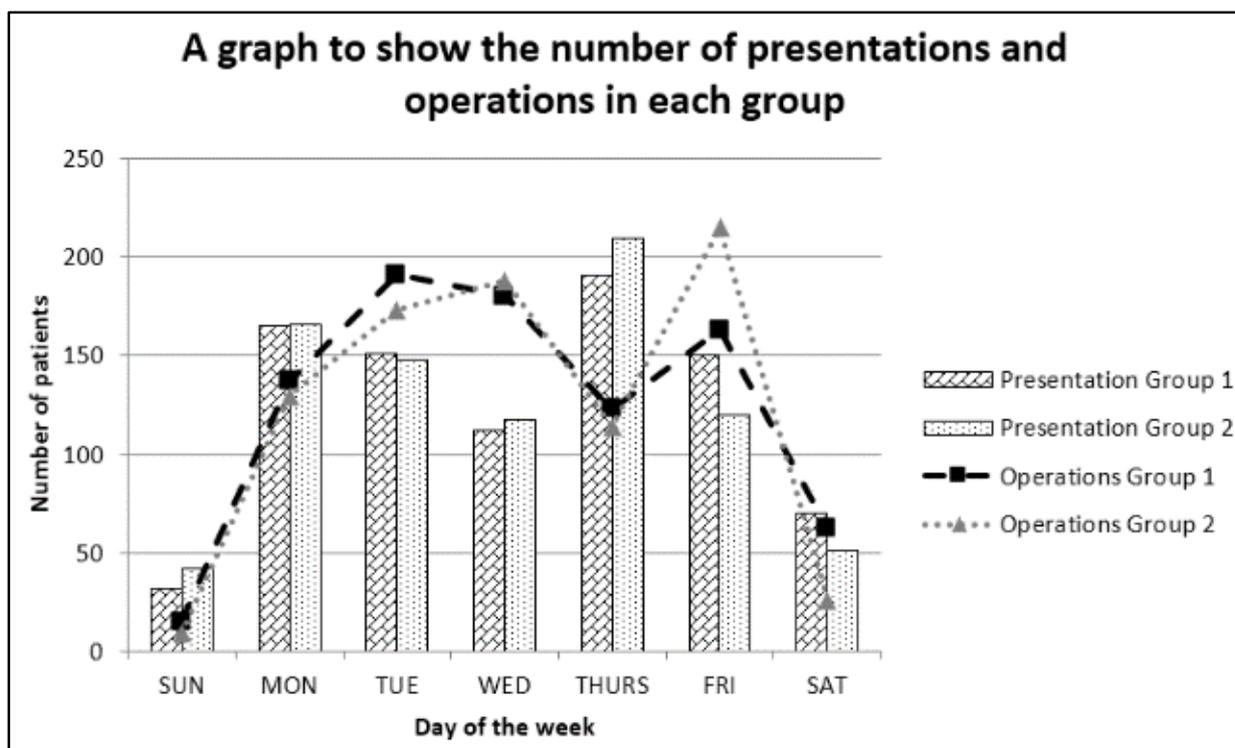


Fig. 1

Fig. 1: This graph shows how many cases present requiring surgery by day of the week. There was little changes between the two groups. It also shows the number of operations that were done on each day. It can be seen that changes were made to the number of operations performed on a Friday as well as a reduction in the number of weekend operations.

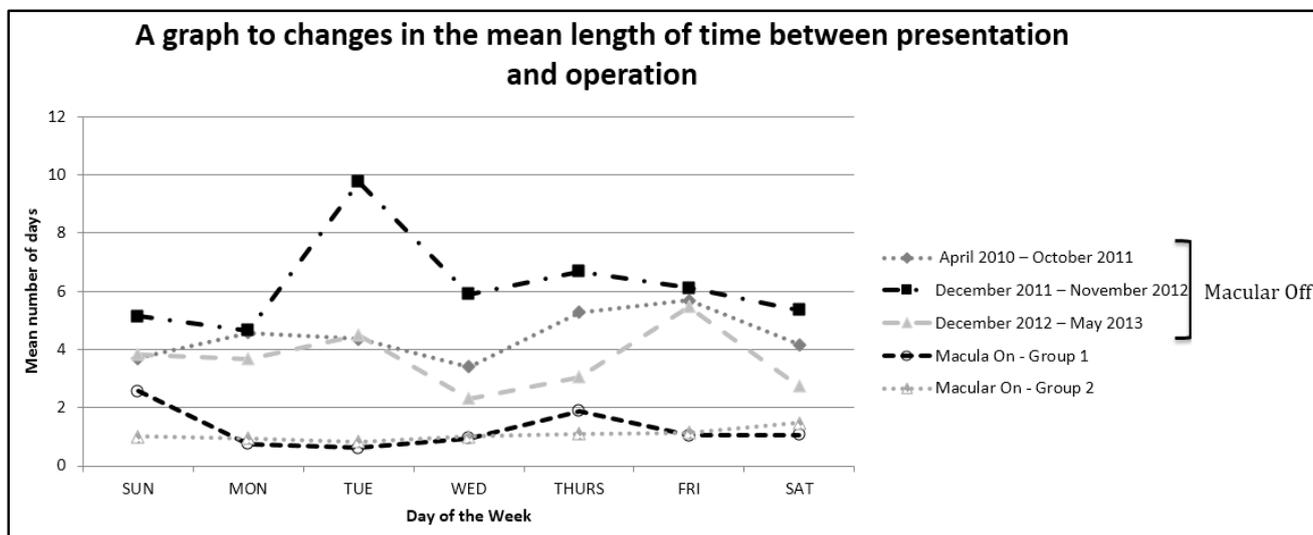


Fig. 2

Fig. 2: The graph shows the effect on introducing a consultant on-call system to the mean length of time between presentation and operation by day of the week for both macular on and macular off retinal detachments. For macular on retinal detachments, the introduction of an on-call system resulted in less variation between the length of time regardless of the day of the week, which the patient presented and with an overall lower mean length of time. For macular off retinal detachments, there was initially an increase in the mean length of time following the introduction of an on-call system, however, within a year, this had been dramatically changed with a shorter waiting times. Overall, all retinal detachments are now on average being treated quicker and there is less variation between days.

DISCUSSION: The demographics of our patients were similar to previous studies with a greater number of males with a mean age of 58.5 years. The fluctuating number of presentations during the week was unexpected and was countered by reallocation of theatre lists. The weekend on-call cooperative allowed better and more targeted access for macula-on detachments, no further onward referrals due to lack of capacity were required. The wait for an operation for macula-on detachments at the weekend slightly increased after the changes as chronic long-standing macula-on detachments were not operated on.

The integrity of the macula can be ensured by early surgical intervention and preoperative positioning in order to prevent the RD from extending into the macula. Progression of subretinal fluid into the macula causes disruption of the photoreceptors and potential loss of visual function.¹⁴ However, the significance of this is less important in those with a chronic RD. Not all RDs progress at the same rate.¹⁵ The RCOphth guidelines for macula-on retinal detachments does not reflect this scenario and does not fully address the range of patients that present to our unit. Despite the considered variance from the RCOphth guidelines, the guideline target was missed by 14.4 minutes overall.

Eyes with giant retinal tears and superior bullous RDs encroaching on the macula are at greater risk of macula involvement and had a higher surgical priority. Previous studies investigating the timing of surgery for macula-on RDs found no relationship between timing of surgery and postoperative visual acuity or single surgical procedure success rate.¹⁶ Studies have shown that a small delay in the timing of surgery does not compromise outcome, however, we would advocate that retinal reattachment surgery should be undertaken as soon as reasonably possible. Macula-off detachments were all operated on within our target of 7 days from presentation. The duration of macula detachment has a significant effect on final visual outcome. Macula-off RDs that are less than or equal to 8 days in duration have been shown to have a significant improvement in VA at each follow-up visit, which continues for up to 1 year after postoperative repair.¹⁴ This suggests that early surgical intervention maybe beneficial for long-term visual outcome. Macula-off RDs that are greater than 8 days in duration have been shown to have a guarded visual prognosis reducing the potential for long-term visual gain.¹⁴

It has been postulated that longstanding macula-off RDs maybe more likely to demonstrate a persistent disruption of the inner segment/outer segment (IS/OS) junction after surgical repair.¹⁴ Delaying surgery can also result in further extension of the detachment. Over two quadrants of detachment increases the risk of patients developing PVR.¹⁷ PVR causes visual loss by irreversible photoreceptor loss and malapposition to underlying retinal pigment epithelium causing misalignment of photoreceptors and visual acuity loss.¹⁸ From these previous studies, we are able to prioritise the emergency cases. Improved resource allocation allowed us to deal with all our cases in a timely fashion whilst reducing the total number of procedures performed over the weekend. Further research could include whether outcomes varied on when patients presented and whether the introduction of this on-call service has resulted in better outcomes following surgery in particular for those that present at the weekend. The recommendations are that all regions should have a dedicated on-call VR consultant.

This service should be provided using a combined rota for the consultants in the region to provide a specialist service from one trust.

CONCLUSION: The outcome of this study shows that the introduction of a consultant led VR on-call service results in a higher proportion of emergency RDs being operated on within the recommended time frame. Patients with macula-on RDs are now treated more promptly on average with the target of treatment mainly being within 24 hours. There was an initial impact on the macula-off RDs, we suspect due to resource diversion. However, within 12 months of service, implementation of all RDs were being treated in a timelier manner. The introduction of the on-call service has resulted in an increased efficacy in management of patients, which are more compliant to the guidelines set out by the RCO. The VR surgeons now provide a seven-day-a-week service in the West Midlands through BMEC.

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